to generate the values corresponding to the bits transmitted through the first layer, and may output the values to the first bit deinterleaver **2213**.

[0436] The first bit deinterleaver **2213** may deinterleave the signal output from the constellation demapper **2212**.

[0437] Specifically, the first bit deinterleaver **2213** may inversely perform the operation performed by the first bit interleaver **112** of the transmitting apparatus **100**, to thereby deinterleave the value corresponding to the bits and to output the first LDPC decoder **2214**.

[0438] The first LDPC decoder **2214** may restore information word bits transmitted through the first layer using the values output from the first bit deinterleaver **2213**.

[0439] Specifically, the first LDPC decoder **2214** may perform LDPC decoding using the values output from the first bit deinterleaver **2213** using a method corresponding to the LDPC encoding performed by the LDPC encoder (not shown) of the first encoder **111** of the transmitting apparatus **100**. That is, the first LDPC decoder **2214** may perform the LDPC decoding using the values output from the first bit deinterleaver **2213** based on the parity check matrix used when the LDPC encoder (not shown) of the first encoder **111** performs the LDPC encoding, to thereby restore LDPC information word bits and LDPC parity bits from the first layer signal.

[0440] In addition, the first BCH decoder **2215** may perform BCH decoding on the LDPC information word bits decoded by the first LDPC decoder (not shown) using a method corresponding to the BCH encoding performed by the BCH encoder (not shown) of the first encoder **111** of the transmitting apparatus **100**, to thereby restore the information word bits transmitted through the first layer.

[0441] Through the above-mentioned operations, the receiving apparatus **1000** may receive the information word bits transmitted through the first layer signal.

[0442] The LLR coupler **2216** may sum LLR values, and may output the summed LLR values to the bit interleaver **2217**.

[0443] Specifically, the first bit deinterleaver **2213** may deinterleave the values corresponding to the bits transmitted through the first layer, that is, the LLR values to output the deinterleaved values to the LLR coupler **2216**. In addition, the LDPC decoder **2214** may update the LLR values received from the first bit deinterleaver **2213** using a message passing operation, and may decide the bit value as 0 or 1 based on the updated LLR values to decode the LDPC information word bits and the LDPC parity bits from the first layer signal, wherein the updated LLR values may be output to the LLR coupler **2216**.

[0444] Accordingly, the LLR coupler **2216** may couple the LLR values received from the first bit deinterleaver **2213** and the LLR values received from the first LDPC decoder **2214**, and may output the coupled LLR values to the bit interleaver **2217**.

[0445] Specifically, the LLR coupler **2216** may subtract the LLR values received from the first bit deinterleaver **2213** from the LLR values received from the LDPC decoder **2214**, and may then output the value (i.e., extrinsic LLR=LLR of LDPC decoder output−LLR of LDPC decoder input) to the bit interleaver **2217**.

[0446] The bit interleaver **2217** may interleave the values output from the LLR coupler **2216**.

[0447] Specifically, the bit interleaver **2217** may interleave the values output from the LLR coupler **2216** with the same system as that performed by the first bit interleaver **112** of the transmitting apparatus **100**, and may output the interleaved values to the joint constellation mapper **2219**.

[0448] The delayer **2218** may delay the signal output from the time deinterleaver **2211** to output the delayed signal.

[0449] Specifically, the delayer **2218** may delay the signal output from the time deinterleaver **2211** as much as a time (Delay T) obtained by summing all times taken to perform a signal processing at the constellation demapper **2212**, the first bit deinterleaver **2213**, the first LDPC decoder **2214**, the LLR coupler **2216**, and the bit interleaver **2217** to output the delayed signal to the joint constellation demapper **2219**.

[0450] The joint constellation demapper **2219** may demodulate the signal output from the delayer **2218**, to thereby generate values corresponding to the bits transmitted through the second layer.

[0451] Specifically, the joint constellation demapper **2219** may perform the full-search for the signal output the delayer **2218** based on the modulation scheme performed by the first constellation mapper **113** and the second constellation mapper **123** of the transmitting apparatus **100** to search for the constellation points corresponding to the first layer signal and the second layer signal, and may demodulate the constellation points corresponding to the second layer signal to generate the values corresponding to the bits transmitted through the second layer.

[0452] In this case, the joint constellation demapper **2219** may utilize the LLR values for the first layer signal output from the LLR coupler **2216** at the time of the full-searching as a priori LLR value to thereby search for the constellation points corresponding to the first layer signal and the second layer signal. As such, in a joint detection process in which the constellation points corresponding to the first layer signal and the second layer signal are searched through the full-search to calculate the LLR values corresponding to the constellation points, the joint constellation demapper **2219** may utilize the LLR values for the first layer signal as a priori probability value.

[0453] In addition, the joint constellation demapper **2219** may output the values corresponding to the bits transmitted through the second layer to the second bit deinterleaver **2220**.

[0454] The second bit deinterleaver **2220** may deinterleave the signal output from the joint constellation demapper **2219**.

[0455] Specifically, the second bit deinterleaver **2220** may inversely perform the operation performed by the second bit interleaver **122** of the transmitting apparatus **100**, to thereby deinterleave the value corresponding to the bits and to output the second LDPC decoder **2221**.

[0456] The second LDPC decoder **2221** may the information word bits transmitted through the second layer using the values output from the second bit deinterleaver **2220**.

[0457] Specifically, the second LDPC decoder **2221** may perform LDPC decoding using the values output from the second bit deinterleaver **2213** using a method corresponding to the LDPC encoding performed by the LDPC encoder (not shown) of the second encoder **121** of the transmitting apparatus **100**. That is, the second LDPC decoder **2221**) may perform the LDPC decoding using the values output from the second bit deinterleaver **2220** based on the parity check matrix used when the LDPC encoder (not shown) of the second encoder **121** performs the LDPC encoding, to